Airworthiness Directive

AD No.: 2018-0126R1

Issued: 04 August 2023

Note: This Airworthiness Directive (AD) is issued by EASA, acting in accordance with Regulation (EC) 216/2008 on behalf of the European Union, its Member States and of the European third countries that participate in the activities of EASA under Article 66 of that Regulation.

This AD is issued in accordance with Regulation (EU) 748/2012, Part 21.A.3B. In accordance with Regulation (EU) 1321/2014 Annex I Part M.A.301, or Annex Vb Part ML.A.301, as applicable, the continuing airworthiness of an aircraft shall be ensured by accomplishing any applicable ADs. Consequently, no person may operate an aircraft to which an AD applies, except in accordance with the requirements of that AD, unless otherwise specified by the Agency [Regulation (EU) 1321/2014 Annex I Part M.A.303, or Annex Vb Part ML.A.303, as applicable] or agreed with the Authority of the State of Registry [Regulation (EU) 2018/1139, Article 71 exemption].

Design Approval Holder's Name:	Type/Model designation(s):
ROLLS-ROYCE DEUTSCHLAND Ltd & Co KG	RB211 Trent 900 Engines

Effective Date:	Revision 1: 11 August 2023 Original issue: 25 June 2018
TCDS Number(s):	EASA.E.012
Foreign AD:	Not applicable
Revision:	This AD revises EASA AD 2018-0126 dated 11 June 2018, which superseded EASA AD 2016-0194 issued 30 September 2016.

ATA 72 – Engine – Low Pressure Turbine Disc Seal Fins and Interstage Seals – Inspection / Replacement / Modification

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Manufacturer(s):
Rolls-Royce plc

Applicability:
RB211 Trent 970-84, 970B-84, 972-84, 972B-84, 972E-84, 977-84, 977B-84 and 980-84 engines, all serial numbers, except those that have embodied Rolls-Royce modification (mod) 72-AJ592 in production.

These engines are known to be installed on, but not limited to, Airbus A380 aeroplanes.

Definitions:
For the purpose of this AD, the following definitions apply:

Where, in this AD, reference is made to an Rolls-Royce Mod, SB or NMSB with an 'A' (Alert) in the number, it should be recognised that an earlier or later revision may not have that 'A'. This kind of change does not effectively alter the publication references for the purpose of this AD.

The NMSB: Rolls-Royce Alert Non-Modification Service Bulletin (NMSB) RB.211-72-AH054 Revision 3.

The SB: Rolls-Royce Alert Service Bulletin (SB) RB.211-72-AJ592.

Qualified shop visit: M52 low pressure turbine (LPT) Module rework level of Module Check and Repair, Refurbishment, or Overhaul; or Engine Check and Repair, or Refurbishment.

Reason:

Following a revenue service flight, a Trent 900 engine experienced increased low pressure vibration. Upon post-flight inspection of the engine, debris was found in the exhaust tail pipe and the engine was removed. The results of a subsequent strip inspection revealed that the stage 2 LPT disc had suffered material loss from a portion of the rear disc seal fin area of the disc, with impact damage to downstream LPT stages. All debris was contained within the engine casings. Preliminary findings showed that the rear disc seal fins had rubbed into the stage 3 interstage seal (ISS) honeycomb seal, which overheated and cracked, finally resulting in releasing a portion of the seal fin area of the disc.

This condition, if not detected and corrected, could lead to LPT stage 2 disc cracks, possibly resulting in an uncontained engine failure and subsequent damage to the aeroplane.

To address this potential unsafe condition, Rolls-Royce published NMSB RB.211-72-AH054 to provide inspection instructions and EASA issued AD 2012-0220 (later revised) to require on-wing inspections of LPT disc seal fins and ISS, each time it is determined that the Engine Health Monitoring (EHM) vibratory levels have been exceeded in flight, and in-shop inspections of the LPT disc seal fins and ISS, to detect cracks or damage and, depending on findings, the accomplishment of applicable corrections action(s).

After EASA AD 2012-0220R2 was issued, another Trent 900 engine experienced increased LP vibration during climb. The pilot commanded an engine shutdown, performed an air turnback, and landed without further incident. The subsequent strip inspection of the engine revealed separation between the stage 1 and 2, and between the stage 2 and 3 LPT discs, as well as missing LPT blades and vanes. A review of all the potential causes of an ISS rub identified that some could be linked to activities which take place during an overhaul shop visit. To protect against all actions during the shop visit which could lead to an undesired heavy ISS rub, Rolls-Royce published NMSB RB.211-72-AH054 Revision 2 to introduce an inspection, to be done after each pass-off test. Rolls-Royce also introduced additional criteria for inspection of the stage 2, 3 and 4 LPT disc seal fins and ISS, and removed the requirement to inspect stage 5 LPT disc seal fins and ISS. Consequently, EASA issued AD 2016-0194, which partially retained the requirements of EASA AD 2012-0220R2, which was superseded, introduced the requirement to inspect the LPT disc seal fins and ISS following pass-off test, and changed certain inspection requirements.

After that AD was issued, Rolls-Royce developed mod 72-AJ592 and published the SB accordingly, to provide modification instructions. This mod introduces LPT stage 2, 3 and 4 nozzle guide vane rear support and seal ring assemblies, featuring increased cold build clearances. In addition, Rolls-Royce issued the NMSB to exclude post-mod 72-AJ592 engines from the inspections, but included pre-mod 72-AJ592 RB211 Trent 972E-84 engines. The inspections of these engines were, until now, managed

through the relevant Airworthiness Limitations Section (ALS) of that engine Model. Rolls-Royce will revise the ALS accordingly, removing those instructions for the model 972E-84 engines.

Consequently, EASA issued AD 2018-0126, retaining the requirements of EASA AD 2016-0194, which was superseded, excluding post-mod 72-AJ592 engines from the Applicability, adding RB211 Trent 972E-84 engines to the Applicability and requiring introduction of the modification in-service, which constitutes terminating action for the repetitive inspections required by that AD.

Since that AD was issued, based on the results of recent re-assessment of the risk, taking into account the long-term grounding of affected aeroplanes due to the Covid pandemic and the consequent number of flights being less than originally anticipated, it was determined that the engine modification compliance time could be extended by 36 months.

For the reasons described above, this AD is revised to extend the compliance time for modification.

Required Action(s) and Compliance Time(s):

Required as indicated, unless accomplished previously:

Inspections:

(1) From 05 November 2012 [the effective date of EASA AD 2012-0220 at original issue], accomplish the following actions:

(1.1) Within 10 engine flight cycles (EFC) following receipt of an Engine Health Monitoring (EHM) notification for N1 vibration levels exceeding the alert limits during flight (see Note 1 of this AD), perform troubleshooting to determine vibration indication fault or high vibration, in accordance with the Airbus A380 Trouble Shooting Manual (TSM) Task 77-00-00-810-803-A, paragraph 2 - Fault Confirmation.

If it cannot be confirmed that the vibration increase has been caused by an indication fault, and if acceptable vibration levels have not been restored through applicable corrective actions (see Note 2 of this AD), inspect the LPT disc seal fins and ISS in accordance with the instructions of section 3.B of the NMSB.

Note 1: Rolls-Royce Operational Service Desk (OSD) automatically receives, monitors and analyses EHM data, and will send a notification containing the wording as shown in Figure 1 of this AD. The Rolls-Royce OSD will close out the alert when confirmation is received from the operator that the actions required in paragraph (1.1) of this AD have been carried out by the operator.

Figure 1 – Alert Notification

This alert is the subject of an EASA AD, and inspection of the LPT ISS may be required.

Note 2: Vibration levels caused by LP compressor unbalance following maintenance may be restored through corrective actions defined in the Airbus A380 Aircraft Maintenance Manual (AMM).

(1.2) For operators who are not using the Rolls-Royce EHM service, within 200 EFC after 14 October 2016 [the effective date of EASA AD 2016-0194] and, thereafter, at intervals not to exceed 200 EFC, inspect the LPT disc seal fins and ISS in accordance with the instructions of section 3.B of the NMSB.

In-Shop Post-Pass-off Test Inspection:

(2) From 14 October 2016 [the effective date of EASA AD 2016-0194], each time a pass-off test is performed on the engine after induction into a Repair and Overhaul Shop, following that test, inspect the LPT disc seal fins and ISS in accordance with the instructions of section 3.C of the NMSB. These inspections are not required when the engine is inducted into a Repair or Overhaul Shop where, due to the level of work performed, a pass-off test is not necessary.

Corrective Action(s):

(3) If, during any inspection as required by paragraph (1.1) or (1.2) of this AD, as applicable, any crack or material loss from the disc seal fin is found, before next flight, remove the engine from the aeroplane and, before release to service of the engine, replace the affected parts with serviceable parts.

(4) If, during any in-shop inspection as required by paragraph (2) of this AD, any crack or material loss from the disc seal fin is found, before release to service of the engine, replace the affected parts with serviceable parts.

Credit:

(5) Inspections and corrective actions on an engine, accomplished before 25 June 2018 [the effective date of the original issue of this AD] in accordance with the instructions of Rolls-Royce Technical Variance (TV) TV125060, or TV125658, or the NMSB at original issue, or Revision 1, or Revision 2, as applicable, are acceptable to comply with the initial requirements of paragraphs (1), (2), (3) and (4) of this AD for that engine.

(6) Inspections and corrective actions on a Model RB211 Trent 972E-84 engine, accomplished before 25 June 2018 [the effective date of the original issue of this AD] in accordance with the instructions of the applicable Time Limits Manual, are acceptable to comply with the initial requirements of paragraphs (1), (2), (3) and (4) of this AD for that engine.

Modification:

(7) During any qualified shop visit after 25 June 2018 [the effective date of the original issue of this AD], but not later than 30 September 2028, modify the engine in accordance with the instructions of the SB.

Terminating Action:

(8) Corrective actions on an engine, as required by paragraph (3) or (4) of this AD, as applicable, do not constitute terminating action for the requirements of paragraphs (1) and (2) of this AD for that engine.

(9) Modification of an engine as required by paragraph (7) of this AD constitutes terminating action for the requirements of paragraphs (1) and (2) of this AD for that engine.

Ref. Publications:

Airbus A380 AMM and TSM.

Rolls-Royce Trent 900 Generic EMP, currently at issue 29, dated 09 February 2018.

Rolls-Royce Alert NMSB RB.211-72-AH054 dated 14 September 2012, or Revision 1 dated 05 November 2012, or Revision 2 dated 24 August 2016, or Revision 3 dated 01 February 2018.

Rolls-Royce TV125060 issue 1, dated 27 July 2012, or issue 2 dated 30 January 2013.

Rolls-Royce TV125658 issue 2, dated 14 August 2012.

Rolls-Royce Trent 900 Alert SB RB.211-72-AJ592 dated 04 September 2017.

The use of later approved revisions of the above-mentioned documents is acceptable for compliance with the requirements of this AD.

Remarks:

1. If requested and appropriately substantiated, EASA can approve Alternative Methods of Compliance for this AD.

2. The original issue of this AD was posted on 27 April 2018 as PAD 18-062 for consultation until 25 May 2018. The Comment Response Document can be found in the EASA Safety Publications Tool, in the compressed (zipped) file attached to the record for this AD.

3. Enquiries regarding this AD should be referred to the EASA Safety Information Section, Certification Directorate. E-mail: ADs@easa.europa.eu.

4. Information about any failures, malfunctions, defects or other occurrences, which may be similar to the unsafe condition addressed by this AD, and which may occur, or have occurred on a product, part or appliance not affected by this AD, can be reported to the EU aviation safety reporting system. This may include reporting on the same or similar components, other than those covered by the design to which this AD applies, if the same unsafe condition can exist or may develop on an aircraft with those components installed. Such components may be installed under an FAA Parts Manufacturer Approval (PMA), Supplemental Type Certificate (STC) or other modification.

5. For any question concerning the technical content of the requirements in this AD, please contact your designated Rolls-Royce representative, or download the publication from your Rolls Royce Care account at https://customers.rolls-royce.com.

   If you do not have a designated representative or Rolls Royce Care account, please contact **Corporate Communications** at **Rolls-Royce plc**, P.O. Box 31, Derby, DE24 8BJ, United Kingdom Telephone +44 (0)1332 242424,

   or send an email through https://www.rolls-royce.com/contact-us/civil-aerospace.aspx identifying the correspondence as being related to **Airworthiness Directives**.